

The Active Rack Isolation System on STS-79 will help set the stage for space station. Story on Page 3.



The Business and Information Systems Directorate take home small business accolades. Photo on Page 4.

Space News Roundup

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STS-79 Commander Bill Readdy floats through a tunnel that connects *Atlantis'* flight and mid decks to the Spacehab module in the cargo bay. The Spacehab will serve as an orbiting laboratory when *Atlantis* docks with the Russian Mir Space Station.

Atlantis returns to Mir for Lucid, Blaha exchange

By Karen Schmidt

Atlantis was poised to dock with the Russian Mir Space Station late Wednesday as Astronaut Shannon Lucid wrapped up her preparations for a return to Earth after six months on the Russian outpost.

Atlantis left Launch Pad 39A at 3:54 a.m. CDT beginning a 10-day mission that will see the first exchange of American astronauts in space. Shortly after liftoff *Atlantis'* auxiliary power unit 2 shut down prematurely after main engine cutoff. The mission management team reviewed engineering data of the shutdown and decided *Atlantis'* two other fully functional APUs would be sufficient to continue with the 10-day mission.

"In looking at the data, it looks almost like one of the fuel valves to the APU shut, basically cutting the fuel off that was going to it, and it did a nominal ramp down just like it would if you were shutting the thing down," said Lee Briscoe, the STS-79 mission operations representative. "The team has hypothesized that a number of different things could have caused this and you can't put your finger on a specific cause. There are probably three or four different things that could have caused it to shut down."

The team will continue to look at data before making a decision of whether to try to start the APU during the flight control system check out the day before *Atlantis* is scheduled to land. APUs provide hydraulic power to *Atlantis'* flight control surfaces during entry and landing.

Commander Bill Readdy and Pilot Terry Wilcutt began rendezvous burns late Monday that positioned

the orbiter for link up with the Russian station. Mission Specialists Jay Apt and Carl Walz set up the Active Rack Isolation System. The ARIS, a prototype of an International Space Station system, is designed to eliminate disturbances or vibrations to achieve true microgravity results in science experiments. After activation, investigators discovered a bent push rod in one of the experiment's actuators, and the crew went through a repair procedure to replace the push rod Tuesday night.

Apt and Walz also helped Mission Specialists Tom Akers and John Blaha pack some of the 4,600 pounds of food and equipment that will be transferred once *Atlantis* is docked to the station.

At mid-week, *Atlantis* was scheduled to dock with Mir at 10:13 p.m. Wednesday and open the hatch about two hours later. After crew welcome ceremonies were to be completed, Mission Specialist John Blaha was expected to become part of the Mir 22 crew as Lucid becomes part of *Atlantis'* crew.

"The first thing we do after the greeting ceremony is I take my survival equipment, my Russian space suit and all of my personal equipment on to the Mir," Blaha said. "We put my equipment into the Soyuz capsule and we take Shannon's out and right after that transfer of equipment, that's when I become part of the Mir crew and Shannon becomes part of the shuttle crew."

After the crew transfer, both crews will settle in for five days of joint science operations in the Spacehab module. The module, redesigned for this flight to provide more science

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Brown to command mission to study Earth's atmosphere

By Eileen Hawley

Three-time shuttle veteran Curtis Brown will command the crew of STS-85 during *Discovery's* 11-day mission to study changes in the Earth's atmosphere.

STS-85 is targeted for a July 1997 launch and will carry a crew of five including Pilot Jeffrey Ashby and Mission Specialists Jan Davis, Robert Curbeam and Stephen Robinson. Ashby, Curbeam and Robinson will be making their first trips to space. Davis is a veteran of two missions.

Davis will use *Discovery's* robot arm to deploy the Cryogenic Infrared Spectrometers and Telescopes for the Atmosphere—Shuttle Pallet Satellite, or CRISTA-SPAS, for about 48 hours of free-flight. CRISTA-SPAS consists of three telescopes and four spectrometers that will measure trace gases and dynamics of the Earth's atmosphere. Davis also will operate the robot arm for CRISTA-SPAS retrieval.

Two other instruments mounted on the Shuttle Pallet Satellite also will study the Earth's atmosphere. The Middle Atmosphere High Resolution Spectrograph Instrument will measure hydroxyl and nitric oxide by sensing UV radiation emitted and scattered by the atmosphere, while the Surface Effects Sample

Monitor will evaluate the effects of atomic oxygen on optical materials.

The Shuttle Pallet Satellite on which the scientific instruments are mounted is a platform that provides power, command, control and communication with *Discovery* during free-flight. CRISTA-SPAS previously flew on STS-66 in 1994. STS-85 will mark the fourth in a series of missions designed to study the Earth's atmosphere.

The crew also will support the Manipulator Flight Development investigation being sponsored by NASDA, the Japanese Space Agency. MFD consists of three separate experiments located on a support truss in the payload bay and is designed to demonstrate applications of the shuttle's robot arm for possible use on the Japanese Experiment Module of the International Space Station.

Several hitchhiker payloads, including the Technology Applications and Science-01, the International Extreme Ultraviolet Hitchhiker-02, the Solar Extreme Ultraviolet Hitchhiker, and the Ultraviolet Spectrograph Telescope for Astronomical Research will be housed in *Discovery's* payload bay, operating independently of crew support during the flight.



Brown

JSC inspection an opportunity to explore technology

JSC will open its doors on Nov. 13 and 14 to business leaders and technical representatives from outside the NASA/aerospace community to learn more about the center's missions, facilities and technologies.

The event, titled "NASA Johnson Space Center Inspection...an Opportunity to Explore," is focused on showcasing JSC's technologies, facilities and technical capabilities which may have commercial applications to industries that are not typically associated with NASA or the aerospace industry.

A team of representatives from across the center, led by Bob Holkan, has been working for several months on the content and format for the program, and will be issuing letters of invitation to a large number of CEOs and corporate representatives.

"We've really worked hard to come up with an approach that would give attendees a great deal of flexibility in planning their own time at JSC based on their individual interests," said Holkan. "We have an outstanding program that allows our guests to

choose from over 100 demonstrations, exhibits and tours across the center. They'll not only have a chance to discover possible benefits and partnerships, but they'll learn quite a bit about our programs, as well."

Representatives will be invited from such industry fields as chemical and petroleum, energy, transportation, agriculture, manufacturing, medical and engineering. Visitors will be provided with an orientation briefing in Bldg. 9, where visitors will be welcomed and registered. From there, they will be provided

transportation to 17 different buildings, onsite and off, where they will be met by technical hosts who will acquaint them with the facilities and answer questions.

The program will feature tours and demonstrations in areas such as robotics technology, advanced life support, space suits, structures and thermal technologies, communications technologies, space environment simulation, flight simulation, manufacturing, flight operations command and

Please see **EMPLOYEES**, Page 4

Video conference opens interactive doors

Residents visiting the "Wonders of Technology" pavilion at the 1996 Minnesota State Fair were able to take part in the JSC Open House by way of a live video-conference link between Bldg. 9 and the NASA exhibit in the pavilion.

Visitors to JSC's Open House talked with Minnesota residents via video conferencing about the mock-up facility. In addition, astronauts and engineers gave several demonstrations that were televised to the fair and visitors were able to practice station assembly operations, dock the space shuttle to the Russian Mir Space Station, and perform a fly-around of space station from a

Manned Maneuvering Unit engineering mockup.

This was only one of the many interactive items supporting the "Great Minnesota Get Together" held Aug. 22 through Sept. 2. The Space Station Outreach and Education Team exhibit attracted more than 600,000 visitors this year at what is one of the country's largest state fairs.

"This is truly a team effort by Life Sciences, Engineering, the Astronaut Office, the Office of Public Affairs, Boeing Public Affairs and Space Station's Operations and Utilization Office," said James Dean, lead of the Space Station Outreach

and Education Team. "This is the third year the Minnesota High Technology Council has invited us to take part in a new concept that has evolved and grown at the Minnesota State Fair."

The High Technology Council has recognized the decrease in participation and interest in the agricultural focus of the fair. The infant "Wonders of Technology" pavilion presents the latest in technology and highlights those businesses in Minnesota leading the field, such as 3M, West Publishing, US West, University of Minnesota and others.

"We want people to come to the

Please see **FAIR**, Page 4



Renee Falls, right, of the Space Station Outreach and Education Team shows a Minnesota visitor how the Manned Maneuvering Unit engineering mockup works. More than 600,000 visitors stopped by the Educational display recently at the Minnesota State Fair.

JSC

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Store from 10 a.m.-2 p.m. Monday-Thursday and 9 a.m.-3 p.m. Friday. For more information, call x35350 or x30990.

Astroworld NASA Night: Astroworld will have a NASA night from 6 p.m.-midnight Sept. 27. Tickets cost \$14.02.

Entertainment '97 books: Cost is \$25.

EAA Belize Resort Trip: Available Sept. 1-Dec. 15, \$472 double occupancy, \$100 deposit required, final payment due 30 days before departure.

EAA Caribbean Getaway Cruise to Puerto Rico: Jan. 3-13, \$1198 double occupancy with airfare, \$999 cruise only, final payment due Nov. 4.

Sam Houston Race Park Track Pack: \$10 value pack for \$5.25, includes Club Level seating, program, tip sheet, admission, preferred parking and gift shop discount.

Splashdown: One day pass cost \$14.25.

Schlitterbahn: One day pass cost \$19.75 for adults, \$16.95 for children.

Astroworld: One day pass cost \$22.75, two day pass cost \$34.25.

Fiesta Texas: One day pass cost \$22.75, two day pass cost \$34.25.

Six Flags at Arlington: One day pass cost \$22.75, two day pass cost \$34.25.

Sea World: Adult tickets cost \$24.50, children (3-11) cost \$17.25.

Space Center Houston: Discount tickets, adult, \$8.75; children (4-11), \$6.25, annual membership, \$22.95, family membership, \$59.95.

Movie discounts: General Cinema, \$4.75; AMC Theater, \$4.50; Sony Loew's Theater, \$4.75.

Stamps: Book of 20, \$6.40.

Metro tickets: Passes, books and single tickets available.

JSC

Gilruth Center News

Sign up policy: All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a NASA badge or yellow EAA dependent badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

EAA badges: Dependents and spouses may apply for photo identification badges from 7:30 a.m.-9 p.m. Monday-Friday; and 8 a.m.-4 p.m. Saturdays. Cost is \$5. Dependents must be between 16 and 23 years old.

Nutrition intervention program: A six-week program to learn more about the role diet and nutrition play in health, including lectures, private consultations with a dietitian and blood analysis. Program is open to all employees, contractors and spouses. For more information call Tammie Shaw at x32980.

Defensive driving: One-day course is offered once a month. Cost is \$25.

Stamp club: Meets at 7 p.m. every second and fourth Monday in Rm. 216.

Weight safety: Required courses for employees wishing to use the weight room is offered from 8-9:30 p.m. Sept. 24. Pre-registration is required. Cost is \$5.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays.

Aikido: Martial arts class meets from 6:15-7:15 p.m. Tuesday and Wednesday. Cost is \$35 per month. New classes begin the first of each month.

Aerobics: Classes meet every Monday, Tuesday, Thursday and Friday.

Ballroom dancing: Cost is \$60 per couple. For additional information call the Gilruth Center at x33345.

Country and Western dancing: Beginner class meets 7-8:30 p.m. Monday. Advance class meets 8:30-10 p.m. Monday. Cost is \$20 per couple.

Fitness program: Health Related Fitness Program includes a medical examination screening and a 12-week individually prescribed exercise program. For more information call Larry Wier at x30301.

JSC

Property

Sale/Trade: Heavy wooded lot, .5 acre at Sam Rayburn Lake, 2 camper lots at Lake Livingston. Dave Ayoub, 280-2014.

Lease: El Lago, 3-2-2, 1 yr lease, no pets, \$950. 474-3473.

Sale: Canyon Lake, 3-2, lake view, vaulted ceilings, rock FPL, 1200 sq ft deck storage, 12x12 gazebo, waterfall, satellite dish, 1800 sq ft, \$124k. Owner, 210-899-3447 or 520-1777.

Sale/Rent: University Trace condo, 1BDR + study, W/D, covered parking, \$520 mo. x48621 or 480-2417.

Sale: League City, 3-2-2D, brick, both formals, lg family room, no MUD taxes, newly painted, -2100 sq ft, \$80k by owner. 480-6275 or 544-5261.

Rent: El Dorado Way condo, 2-2, new carpet, W/D, FPL, downstairs, \$475 mo. x49674 or 326-5754.

Rent: Baybrook condo, W/D, FPL, new carpet, \$400 mo. x49674 or 326-5754.

Rent: Scarsdale, 3-1-5-2, fenced, refrig, central A/C, new paint/roof and tile, no pets, \$670. 486-0315.

Rent: Tranquility Lake condo, 1BDR, W/D, gated entry, \$480 mo. Andy, 282-3257 or 334-5291.

Sale: Deer Park, 3-1-5-1, 1186 sq ft, new roof/carpet AC/siding/bath, alarm sys, ex cond, 64.9k. 479-4641.

Sale: Heritage Park, 3-2-2, brick 2-story home, by owner, below appraised value, \$77.5k. 482-8845.

Rent: Duplex in Santa Fe, TX, 3-1-5 duplex, formal LR and DR, kitchen appli, central air/heat, W/D conn, sm yard, adults, non-smokers, no pets, \$550 mo. + security deposit. 244-0250 or 409-925-7839.

Rent: Beach house, Jamaica Beach, West Galveston, all amenities, sleeps 7, wkend/wkly rates. 488-6796.

Rent: South Lake Tahoe cabin, sleeps 8, cable TV, 3-2, modern kitchen, W/D, \$85/ntly/wkly/holiday rates. x41065 or 326-2866.

Cars & Trucks

'85 Grand Prix, V8, loaded, 1 owner, main records. Mary Helen, 333-6478 or 332-2859.

'96 Saturn SC1, 16k mi, P/W and P/L, upgrade stereo, lots of extras, ex cond, keyless entry. 283-5498 or 992-3417.

'86 Ford custom van, new 302 eng, 16k mi, auto, A/C, new tires, good cond, \$3k. Pete, 283-6813.

'93 Toyota Corolla, white, A/C, manual w/ O/D, \$8.2k nego. Bail, 333-6489.

'85 Olds Cutlass Supreme, new tires, 90k mi, air works, \$600 obo. Steve, 280-1219 or 334-1618.

'92 Toyota PU SR5, all power, A/C, AM/FM, well maintained, 100k mi, \$8,150. x38501 or 980-7481.

'74 Ford Bronco 4x4/302, removable top, A/C, hunter green, ex cond, \$4.5k; Mitsubishi Mirage, runs great, A/C, good/school car. \$1.5k. 280-2217.

'95 Saturn SL2, 4 dr, auto, many extras, tow master hitch recvs for RVs, \$13,250. 474-3612.

'89 Pontiac Lemans, 2 dr, 5 spd, silver, A/C, AM/FM/cass, 82k mi, \$1.9k. Joe, x38851 or 488-1750.

'88 Chrysler, white, 4 dr, LeBaron Town & County, power, new tires, good cond, \$2k obo. 922-7507.

'88 Lincoln Town car, beige, 78k mi, pwr, leather, garage kept, \$6.5k. x33187 or 488-5162.

'84 Lincoln Town car, signature series, loaded, \$2.4k obo. JR, x36382 or 334-1636.

'88 Mazda MX-6 GT Turbo, 72k mi, auto, loaded w/pwr moonroof, P/W and P/L, A/C, 1 owner, ex cond, \$5.5k nego. Steve, 480-6415.

'54 Street Rod Chevy PU on '79 chassis w/454-Cam, Headman headers, Strip Dominator, custom inter, rac-

ing rims, extras, \$4.5k. 409-938-7328.

'92 Chevrolet C1500 PU, very good/clean cond, \$9.7k. 481-6900.

'92 Cad Sedan Deville Touring sedan, 73k mi, white w/tan leather inter, 4.9 L-200 Hp V8, ex cond, \$14k. 489-9312.

'91 Olds Cutlass Ciera, V6, 4 dr sedan, ex cond, 68k mi, A/C, AM/FM/cass, auto, pwr pack, cruise, \$5k obo. x31695 or 532-1089.

'90 1/2 ton Chevy Sportside Silverado, blk, A/C, P/S and P/B, AM/FM/cass, 5 spd OD, \$7k. 332-7037.

'50 Chevrolet 3/4 ton truck, \$2.2k. 286-5971.

'89 Toyota Supra, ruby red/tan interior, loaded, AM/FM/cass, sec sys, 106k mi, \$6.2k nego. Josh, 488-4182.

'85 Audi 4000si, 60k mi, 4 dr, silver, cloth seats, stereo w/cass, ex cond, new tires, auto, \$4.3k. 244-2444 or 488-4382.

'77 Tioga class C RV, 24', new tires/brakes/carpet, extensive tune-up, \$5.5k. Karen, x38784 or 291-9100.

Cycles

Men's 26" 12 spd racing bike, access, new tires, \$50; girls' 24" 10 spd, \$35. Jeff, x31177 or 480-8416.

Boats & Planes

Monarch Jon boat, 14', 20Hp trolling motor, trailer, depth finder, extras, ex cond, \$1.8k obo. 338-9862 or 529-8895.

'85 Sea Ray Bowrider, 21', 260 Hp Merc V8, Alpha I O/D, loaded, ex cond, tandem galv trailer, \$7,995. Keith, x35191 or 996-8318.

'88 Sea Ray Seville 18' bowrider, 130 Hp I/O, pwr trim/tilt, P/S, ss prop, swim platforms, bimini top, AM/FM, under seat cooler, galv trailer, 1 owner, ex cond, incl pair of skis/low rope/coast guard vest, \$7k. x48959 or 532-1673.

'89 Bayliner w/trailer, 16'10". I/O, 2.3L. Cobra eng, \$5k. 334-3066.

'94 SeaDoo XP Wetbike w/trailer and storage box, \$4.5k obo. Jr, x36382 or 334-1636.

Jon boat, 10' aluminum, V-nose, 5.5 Hp, \$150. 409-938-7328.

Aluminum 14' boat, semi-V w/motor and trailer, rigged for fishing, \$750 obo. x36563 or 338-1249.

Audio Visual & Computers

Mac II, 8Mb RAM, Word, Excel w/video card, kybd, mouse, \$195; 14" color monitor, \$325; Mac Power PCs, several config, Bobby, 244-2444 or 488-4382.

Monitors: 14" VGA, \$65; 14" SVGA, \$85; sys 486DX 2-66 14" monitor, 8Mb RAM, 420Mb HD, \$500. Charles, x36422 or 326-5073.

4 Mb RAM, 72 pin w/parity, 1x36, \$35. x41065 or 326-2866.

Mac ix, 20 MHz, 20Mb RAM, 1.2 Gb HD, 14" color monitor, kybd, 1.4Mb FD \$500. x36533 or 388-2388.

Kodak CD ROM Writer, ex cond, \$1.5k obo; 2 Panasonic telephones, 1 integrated w/ans sys/built-in spkr phone, \$85; 1 10-ch auto scan cordless phone w/16 sta auto-dialer, \$75. Sonya, x32920 or 610-9288.

Bel Quantum 3SE 3 band radar detector and Audiovox car phone, model SP85, \$25. 332-2039.

8086 PC w/2 disk drives, 1 HD, Panasonic printer, \$100. 244-8664 or 286-9632.

Lapis Pro Color server 24x color graphics card for Mac SE/30, \$200. 480-3424.

NEC twelve-line complete telephone sys, \$1k; portable HD w/batteries, \$350; hi speed scanner, gray

JSC

Dates & Data

Today

Cafeteria menu: Special: meat sauce and spaghetti. Total Health: baked potato. Entrees: rainbow trout, liver and onions, beef cannelloni, ham steak, fried cod fish, Reuben sandwich. Soup: seafood gumbo. Vegetables: steamed broccoli, breaded okra, cut corn, black-eyed peas.

Monday

Reservations due: Reservations are due by noon Sept. 23 for the American Institute of Aeronautics and Astronautics International Cooperation in Space program at 5 p.m. Sept. 26 at the Gilruth Center. Tickets cost \$10 for members and \$11 for nonmembers and include dinner. For more information call Pam Sisk at x38341 or Danita Thomas at x32348.

Cafeteria menu: Special: turkey and dressing. Total Health: herb flavored steamed pollock. Entrees: breaded veal cutlet, chicken fajitas, steamed pollock, beef, French dip sandwich. Soup: beef and barley. Vegetables: Brussels sprouts, mixed vegetables, egg plant casserole, winter blend vegetables.

Tuesday

Cafeteria menu: Special: pepper steak. Total Health: barbecue chicken. Entrees: baked lasagna, pork chop and fried rice, turkey a la king, baked chicken, fried cod fish, French dip sandwich. Soup: black bean and rice. Vegetables: breaded squash, steamed spinach, baby carrots, navy beans.

Wednesday

Reservations due: Reservations are due Sept. 25 for Quality Forum XII, "Quality 1-on-1: A New Game Plan." The forum, sponsored by the American Society for Quality Control

and Lockheed Martin, will be held at 11 a.m. Oct. 3 at the Gilruth Center. Quality leaders from Hewlett Packard, 3M and NASA will discuss quality issues and advancement in the area of customer satisfaction. For more information call Ann Dorris at 282-3782.

Toastmasters meet: The Space-land Toastmasters will meet at 7 a.m. Sept. 25 at the House of Prayer Lutheran Church. For more information call Jeannette Kirinich x45752.

Astronomy seminar: The JSC Astronomy Seminar will meet at noon Sept. 25 in Bldg. 31, Rm. 129. Sidney van der Bergh will discuss "Asteroids and Dinosaurs." For details call Al Jackson at x35037.

NMA meets: The NASA JSC, United Space Alliance, Lockheed-Martin and Bay Area Community chapters of the National Management Association are hosting a joint NMA meeting at 5 p.m. Sept. 25 at the Gilruth Center. Don Clark, a Federal Bureau of Investigation agent, will discuss "FBI and Teamwork." For more information call an NMA chapter booster or Christina Ford at 282-3521.

Cafeteria menu: Special: Mexican dinner. Total Health: steamed pollock. Entrees: broccoli cheese quiche, spare ribs and sauerkraut, steamed fish, Reuben sandwich. Soup: seafood gumbo. Vegetables: Spanish rice, pinto beans, peas, broccoli.

Thursday

Radio club meets: The JSC Amateur Radio Club will meet at noon Sept. 26 in Bldg. 16, Rm. 253. The meeting will include officer elections. For more information call Larry Dietrich x39198.

CLANG meets: The Clear Lake Area Network Group will meet at 6:30 p.m. Sept. 26 at the Lunar and

Planetary Institute, 3600 Bay Area Blvd. For more information call Bebe Kelly-Serrato at x39021.

Lunar eclipse: The JSC Astronomical Society and Challenger 7 Memorial Park will host a public viewing of the total lunar eclipse at dusk Sept. 26 at Challenger 7 Memorial Park. For more information call the park at 332-5157 or Bill Williams at 339-1367.

Cafeteria menu: Special: hamburger steak with onion gravy. Total Health: baked potato. Entrees: corned beef, cabbage and new potatoes, chicken and dumplings, meat ravioli, French dip sandwich. Soup: broccoli cheese and rice. Vegetables: navy beans, cabbage, cauliflower, green beans.

Friday

Cafeteria menu: Special: tuna noodle casserole. Total Health: broiled chicken breast. Entrees: deviled crabs, broiled pollock, liver and onions, broiled chicken with peach half, Reuben sandwich. Soup: seafood gumbo. Vegetables: Italian green beans, cauliflower au gratin, steamed rice, vegetable sticks.

Oct. 1

ASQC meets: The Bay Area Section of the American Society for Quality Control will meet at 5 p.m. Oct. 1 at the Ramada King's Inn, 1301 NASA Road 1. Sudhir Bafna will discuss "Hypothesis Testing," and Bill Crittenden will discuss "Hazard Identification and Analysis Methods." Dinner costs \$9. For more information call Ray Swindle at 335-6948.

ABWA meets: The American Business Women's Association, Clear Lake Area Chapter will meet at 5:30 p.m. Oct. 1 at Bay Oaks Country Club. For more information call Kathleen Kaminski at x38706.

Swap Shop

scale, Fujitsu Scan Partner, \$900 obo. x32920.

Packard Bell 386/16, color monitor, 540 HD, 4Mb RAM, Windows 3.1, misc software, \$285. 488-3966.

Kenwood stereo sys, 150W/ch, CD, dual tape, 20 pre-set tuner, equalizer, turntable, fl spkrs, \$350 obo. Andy, 282-3257 or 334-5291.

Musical Instruments

Fender Blues DeVille amp, 60W, orig tubes, \$475; Alesis Midiverb III effects processor, \$175; Yamaha classical guitar, \$225. Chuck, 244-5093.

Yamaha FG-4010-12A, 12 string acoustic guitar, good tone, \$225. 212-1475.

PA set w/Yamaha speakers, \$1.1k; Hammond spinet organ mod M3, blonde finish, \$500. 474-3612.

Trombone, ex cond, \$225. 334-2533.

Bundi trombone, ex cond, \$125. x33794 or 977-6787.

Photography

Canon T50 35mm camera, flash, access, \$200; Quasar VHS video camera, \$300. Cheryl, x35049 or 733-2313.

Pets & Livestock

Female cat, 1 yr old. x38603 or 332-1354.

Household

Round oak dining room table, 4 chairs; dishwasher. 486-1888.

Almond refrigerator, ex cond, \$275. Mryna, 281-461-0141.

Metal desk, 5 drawers, freshly painted, \$45. 332-3168.

Montgomery Ward sewing machine and swing-arm table, ex cond, \$60 both; upright vacuum w/attach, works well, \$30; dust-buster car vacuum, ex cond, \$10. 482-7937.

Couch, loveseat, beige, cushions cleaned, end tables, coffee table, make offer. Sandra, x37800.

King sz waterbed, 4 post, 6 drw, underdressed, dk stained pine, \$150. lan, x39574 or 281-461-8372.

Whirlpool refrig/freezer, 20 cu ft, white w/ice maker, glass shelves, \$800. John, x45684 or 527-4195.

'92 Panasonic 27" TV, loaded, needs work, color good, image soft, \$90 obo. 280-9755.

Evenflo child's bed, \$35; round oak table w/4 antique Bentwood chairs, \$200. 286-2235.

Five piece dining room set, blk steel and glass, ex cond, \$200; white formica kitchen table, \$40; computer hutch, \$40. Roland, x48540 or 992-1430.

Glass and brass coffee table, great for sm apart, \$100. Alaura, x40123.

GE Spacemaker microwave, ex cond; dbl bed mattress. 283-5498 or 992-3417.

Dusty rose sofa, loveseat, ex cond, \$495; sm buffet matching china cabinet, Scandinavian, \$475; full sz washer/electric dryer, \$275. Joan, x34681 or 286-5816.

Sofa bed, full sz, blue and sand floor, ex cond, \$65. x35031.

Futon set, couch and loveseat, black frame w/offwhite mattress, extras, \$350. Joe, x35578 or 665-1160.

King waterbed, dual motionless mattress w/headers, 6 hideaway drawers, \$225. 286-9227.

Sofa and chair, blue flower print, ex cond, \$100 both. 488-4463.

Loveseat, ex cond, \$275; pr upholstered designer back chairs, nice, \$100 both; heavily carved table,

round 24"x30", \$125; desk or dressing table, 47.5"x23.5"W, w/ht w/brass handles and trim w/glass top, \$150. 488-5564.

Antique Sessions Mantel clock, mahogany case, Westminster chimes, good working cond, \$150. x30021 or 479-7947.

Wanted

Want non-smoking housemate to share 3-2, Sage-mont, no pets or children, \$385 mo + 1/2 utilities except phone, \$400 dep. Diane, 244-7129.

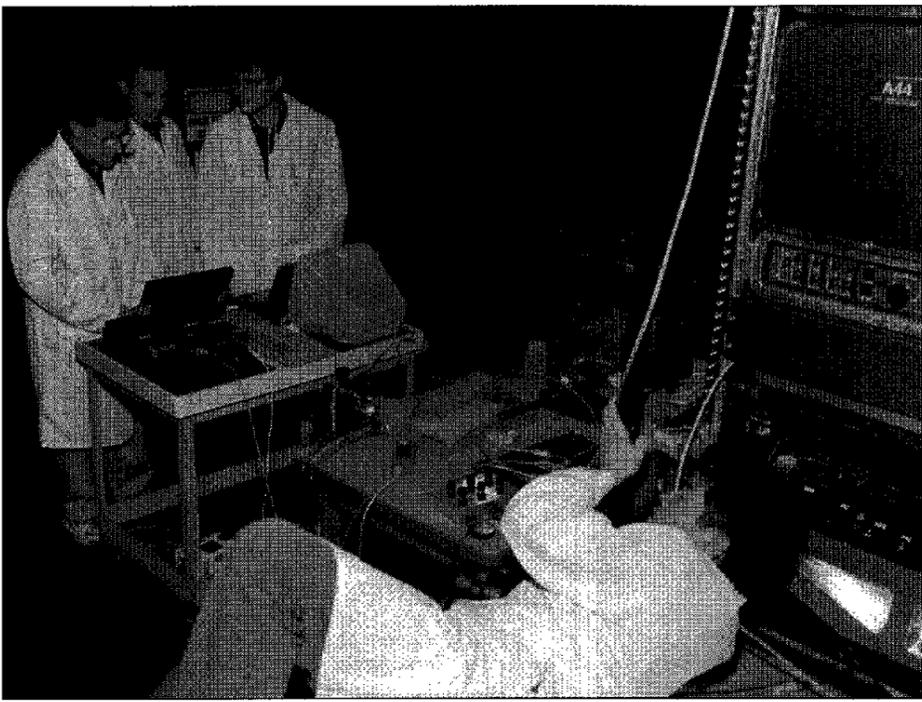
Want male, professional, non-smoking to share 3-2-2 house, Clear Lake, \$400/mo includes all utilities. 474-6359 or 480-1670.

Want roommate, lg 4-2-2, Seabrook, separate loft/living area, phone, cable/fax, W/D, \$375. 474-4742.

Want non-smoking roommates to share 3-2-2, Webster, \$340 includes all utilities except phone, prefer students. 332-8417.

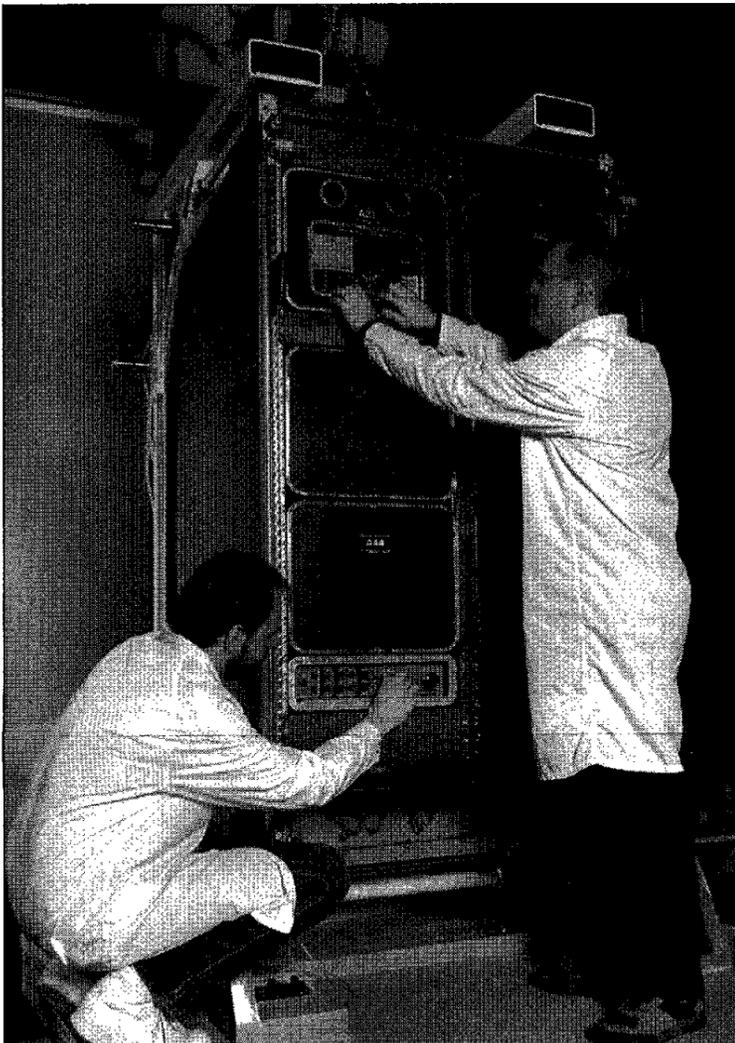
Want professional non-smoking male to share 2-2 townhome, Pearland, \$350, 1/2 util. John, 997-8796.

Want space memorabilia for private collection, flown items, ex. utensils/clothing; autographs on photos, covers, letters, relating to Mercury, Gemini, Apollo, Skylab, Shuttle. Richard or Nancy, 4



Station Simulation

Space station active rack isolation system flies on STS-79 mission



When *Atlantis* blasted off on its fourth rendezvous and docking with the Russian Mir Space Station Monday, a prototype International Space Station rack was on board designed to counter vibrational disturbances that could potentially damage the research results of certain delicate experiments planned on the permanent laboratory in space.

The Active Rack Isolation System, or ARIS, was designed and built by engineers from Boeing, the prime contractor for the International Space Station.

"Among the many areas of research planned on space station, investigations in fluid physics, combustion science, and materials science will be performed," said Space Station Research Manager John-David Bartoe.

"We will be studying the basics of how fluids behave, flow and mix; how the combustion process takes place; and how materials can be purified or formed into alloys. These questions are hard to answer in ground-based laboratories, because gravity causes unwanted effects and disturbances which hide or mask the fundamentals. On station, because it orbits the earth as if it were in constant 'free fall,' we only sense a force equal to about one millionth of the gravity level here on Earth. Some disturbances still occur on station which must be isolated, such as the vibrations of pumps and fans, crew motion, movement of solar arrays and antennas. We must isolate these vibration disturbances from the payloads, and ARIS is the isolator that will do that job."

The ARIS isolates the research payload through a sophisticated electronic sensing and control system as well as umbilical cables and actuators, allowing the rack to float within a half-inch clearance in all directions in the space station.

"The ISS Microgravity Analysis Team showed that vibrations from on-board mechanical disturbances, such as the solar array rotary joint and thermal radiator rotary joints, as well as crew induced vibrations would violate microgravity acceleration requirements," said Vic Cooley, lead for load dynamics and microgravity in the space station vehicle office. "The analysis showed how much vibration attenuation was needed to meet the microgravity requirements and this resulted in the principal performance requirements for all candidate isolation systems. The ISS Microgravity Analysis Team working with Boeing research engineers in Seattle identified the ARIS concept as the most effective solution for meeting the requirements."

The ARIS rack flying on the STS-79 mission resides in the Spacehab module. On the second day of the mission, the ARIS was scheduled to be activated and an extensive series of tests are to be conducted

before, during and after the shuttle docks to the Russian Mir Space Station.

To simulate the weight of future scientific payloads, five lockers within the ARIS rack on STS-79 are filled with 375 pounds of Russian food packages that will be delivered to the Mir crew during the mission. After the astronauts set up the rack, testing will be conducted by Boeing engineers at the Spacehab payload control room at JSC. Once docking is complete, the food within the rack will be unloaded and the rack will be tested again. Test data will be stored on a payload computer.

"Test data will be down-linked in real time as well as stored on a payload computer," Cooley said. "The

Boeing Seattle principal investigator will have first look at the data, and ISS microgravity team members will support the experiment on the ground as well."

When unlocked for microgravity operation, the ARIS rack will float within a half-inch clearance, connected to the space station module by eight actuators and a set of utility umbilicals. The umbilicals provide power, data, fluids, gases and vacuum conditions for science payloads in the rack. The umbilicals also allow some of the module disturbances to enter the rack. The control system will use accelerometers to sense rack vibration and generate response signals to the rack actuators. Then the actuators in the ARIS rack will counter those vibrations by pushing between the rack and the space station module.

Boeing Defense and Space Group engineers began developing the ARIS rack in 1994. The ARIS flying on the STS-79 mission is a prototype system to prove its concept and design. Boeing is contracted to build nine more racks for the International Space Station, with an option for six additional racks. This special system is needed for the space station to support highly sensitive microgravity research at half its payload locations.

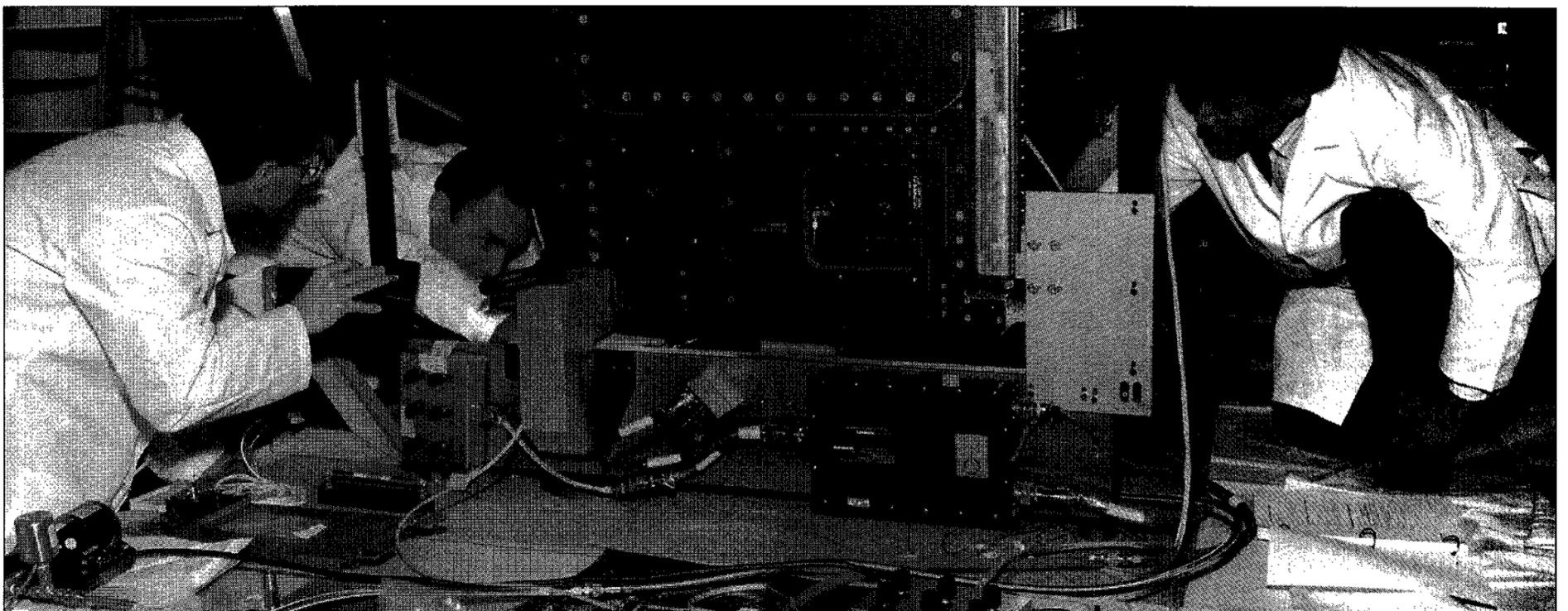
"There were two main challenges in developing the ARIS," said John Larson, Boeing ARIS team leader. "The first challenge was the control system itself, which must operate within tight tolerances. Another challenge was the umbilical connectors for the rack, which must be very flexible so that the control system has as little to counteract as possible."

Boeing engineers in Huntsville, Ala., designed the umbilical connections and made mechanical modifications. The rack's graphite shell also was manufactured in Huntsville. Boeing engineers in Seattle designed and built the ARIS electronics and the control system, outfitted the system, conducted testing on the ARIS rack and shipped the system to the Kennedy Space Center, for launch on the STS-79 mission. □



From top to bottom, left to right, 1) From left, STS-79 Mission Specialists Jay Apt and Carl Walz and David Garman, a Boeing engineer, monitor the on-orbit laptop display during an adjustment of a specially-designed force actuator on the Active Rack Isolation System as Mike Oshima, a Boeing controls engineer, adjust the actuator so the astronauts can see the effect of misalignment. 2) From left, Boeing engineer Steve Smith and technician John Drapala perform an activation step in preparation for ground testing of ARIS. 3) In the Space Station Processing Facility at Kennedy Space Center technicians install an experiment rack in ARIS. 4) From left, Apt and Walz are trained by Oshima on activities they will perform on ARIS while in orbit.

Photos by NASA and Boeing Defense and Space Group



Medical science experts recommend preparing for winter months

The JSC Space and Life Sciences Directorate is recommending that employees traveling to Russia and others who are at risk of catching the flu begin to prepare now for winter with vitamin supplements and flu shots.

The Medical Sciences Division is urging employees who will travel to Star City, Russia, over the coming winter months take extra vitamin D along to supplement the loss of sunlight found in their diets at home at JSC.

"When we look at vitamin D stores for the astronauts and cosmonauts before flight, there is a decrease in their stores in the winter compared to the summer months," said Scott Smith, a research nutritionist in the

Medical Sciences Division. "The body makes vitamin D from sunlight and also gets vitamin D from the diet. Since Star City is so far north compared to Houston, employees should supplement their diet with vitamin D in the winter months. Since vitamin D in excessive amounts is harmful, the supplement should not exceed 10 micrograms per day."

Vitamin D assists in the process of maintaining calcium and phosphorus in the body. Vitamin D deficiency can cause calcium deficiency that may lead to bone loss.

In addition, the 1996 flu season is fast approaching and the JSC Clinic will offer

vaccinations for all NASA-badged and on-site contractor personnel for a limited time this fall.

The clinic will offer influenza shots daily from 10 a.m.-noon and 1:30-3 p.m. beginning Sept. 30 with one exception on Oct. 23.

"Everyone should be out enjoying Safety and Total Health Day," said Lynn Hogan. "On that day, the clinic will be open only for emergencies and occupational injuries."

Shots are recommended for people at increased risk for contracting the disease, including people over 65 years of age or who have chronic cardiovascular or pul-

monary system illness. Individuals who are pregnant, have a fever or are hypersensitive to eggs or any other component of the vaccine will not be given the shot.

Influenza viruses have continually demonstrated an ability to cause major epidemics of respiratory disease. Typical flu illness is characterized by abrupt onset of fever, sore throat and nonproductive cough. This condition, unlike many other common respiratory infections, can cause extreme malaise lasting several days. More severe disease can result from invasion of the lungs by the flu virus including several types of pneumonia.

For additional information, call the clinic at x34111.

ERAU satellite campus to open at Ellington

Embry-Riddle Aeronautical University will open a satellite campus at Ellington Field in January.

Jointly sponsored by the Human Resources Development Branch and Aircraft Operations, ERAU will offer two degree programs. A bachelor of science in aviation maintenance management will help develop careers by building a strong foundation in economics and management, technical studies in aircraft or avionics maintenance and general education studies. The bachelor of science in professional aeronautics will enhance aviation careers by broadening an education base and building on aviation experience. Prior aviation training and experience are prerequisites.

Individuals interested in participating need to make a commitment by Sept. 27 by contacting Mike Radmonovich at x49676 or Mary Lee Meider at x49862. With this information, ERAU will develop a curriculum and schedules. If enough employees commit, ERAU will have representatives at Ellington Field in October to assess qualifications, discuss applications and answer questions. For details on any of JSC's academic programs contact Kaz Hall at x33075.

Employees may volunteer for inspection day

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control, flight training, aircraft operations, medical sciences and technologies, space sciences and a variety of engineering initiatives. Visitors will have the opportunity to ask questions and discuss projects and technologies with the key people associated with them.

Employees interested in getting involved in the inspection can volunteer through their directorate office or contact the Inspection Logistics center at 244-8753. Employees are encouraged to refer names and organizational details of technical and business associates who would benefit from this type of event. A special Internet site has also been established at <http://www.jsc.nasa.gov/seejsc>

Atlantis to return home with Lucid Thursday

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investigation space, is nestled in *Atlantis*' cargo bay and will serve as a microgravity laboratory for the crew members.

Meanwhile, on Mir, Lucid with her Mir 22 crewmates, Commander Valery Korzun and Flight Engineer Alexander Kaleri, have filled bags with equipment, computer and optical discs, videotapes, air, water biological and materials processing experiment samples. All the bags will be transferred to *Atlantis*.

"We finished up most of the science and we're all packed up now and we're waiting for the 79 crew to show up," Lucid said last week. "One of the first things I want to do when I return home is I want to go up to the bookstore and see what new books have been published in the last six months and just browse



JSC Photo by Robert Markowitz
Business and Information Systems Acting Director Jane Stearns and JSC Procurement Officer Scott Thompson receive congratulations from the Small Business Administration District Director Milton Wilson for JSC's outstanding performance in managing the federal contracting office of the year. JSC set aside over 20 awards to small and disadvantaged firms during fiscal year 1996. This is a record for both JSC and for the SBA. From left are Stearns, Wilson, Thompson and Robert Neal, director of the small business program at the Department of Defense.

Lightweight fuel tank passes tests

NASA and Lockheed Martin engineers recently completed a successful series of tests to demonstrate the capability of the new super lightweight external fuel tank for the space shuttle.

The tests were designed to prove the tank's ability to withstand loads greater than flight certification requirements. The super lightweight tank is designed and manufactured by Lockheed Martin Manned Space Systems at the NASA Michoud Assembly Facility in New Orleans.

The successful tests, conducted at NASA's Marshall Space Flight Center, represent a significant milestone for both the shuttle and International Space Station programs. The lighter fuel tank will improve the shuttles' capability to carry cargo to the high inclination 51.6-degree-orbit where the International Space Station will be built. The tests included a first-ever, planned destructive test using a full-scale but shortened version of the external tank's new aluminum lithium hydrogen tank. The test article was 40 feet long, compared to the 154-foot length of a flight tank, but was built to full diameter, or 27.5 feet.

"This series of tests has demonstrated and

verified our robust design approach for the super lightweight tank," said Parker Counts, NASA's external tank project manager. The test program, which began in February, included a certification series of tests followed by the capability tests, which concluded on Sept. 5.

The super lightweight tank is constructed of aluminum lithium, which is a lighter, stronger material than the metal alloy currently used in the production of the shuttle's external tank. NASA was the first to use this new alloy in a major development program. The Marshall Space Flight Center and its contractors worked jointly to develop this alloy for the special applications required in the design of the super lightweight tank. The new external tank will be the same size as the current one, but 7,500 pounds lighter. This lighter weight means that programs will benefit from an additional 7,500 pounds of payload per flight.

The aluminum lithium metals technology associated with the super lightweight tank has been significantly advanced with production of this alloy and the development of manufacturing processes to machine, form and weld the material. This information may be used for future designs of weight critical space vehicles.

JSC subcontractor, employee win awards

Debra Johnson of the Business and Information Systems Directorate and Software Maintenance Specialists Inc., will receive NASA awards next week.

Johnson, along with Laszlo Berke of Lewis Research and Rene Paquette of Kennedy Space Center, will be awarded NASA's Exceptional Achievement Medal for their significant support of the agency's programs in the small business, technical and procurement arenas.

SMS, a subcontractor for Rockwell Aerospace Space Systems Division, has been named Minority Subcontractor of the Year. SMS is under contract to JSC to provide mainframe computer processing for Rockwell's engineering requirements associated with shuttle support and manage mainframe network communication links to other Rockwell facilities and NASA centers.

Award winners will be honored by NASA Administrator Daniel S. Goldin Tuesday in Washington, D.C., during National Minority Enterprise Development Week.

MCC open during STS-79

The Mission Control Center viewing room will be open to JSC and contractor badged employees and their families during portions of the STS-79 mission.

Employees will be allowed to visit the MCC from 11:30 a.m.-1:30 p.m. Wednesday and from 1-3 p.m. Saturday and Sunday. MCC also will open for viewing from 8-10 p.m. Monday for undocking.

Employees must wear their badges and escort family members through the lobby of Bldg. 30 South. Children under five will not be permitted. No flash photography or loud talking will be permitted at any time. Because of the dynamic nature of shuttle missions, viewing hours may be changed or canceled without notice.

For the latest information on the schedule, call the Employee Information Service at x32467.

Fair is testbed for outreach

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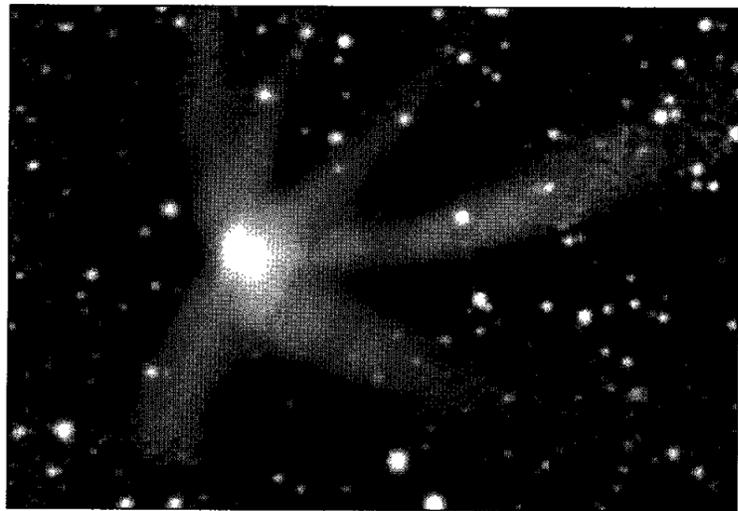
fair and learn of the latest developments in computers, communications and technology, just as they did for farm machinery and agricultural products of fairs passed," said Rick Krueger, president of the Minnesota High Technology Council.

The outreach and education team used this event as a testbed for interactive outreach and education tools.

"If a piece of hardware can make it through the fair, we know we have a winner," said Renee Falls of the outreach and education team.

One of the items that passed the test was a Mission Control Center console rescued from surplus in Bldg. 419. Kids of all ages could not help but push the buttons, turn the knobs and learn that the piece had supported Gemini, Apollo, Skylab and shuttle flights. One visitor casually walked up to the console, studied it, and realized with delight that he had manned this same payload console for some early shuttle flights.

Astronaut and Minnesota native Bob Cabana, who took part in last year's fair by video-conference from Bldg. 9, travel to the fair this year. Astronauts Rich Clifford and Kevin Kregal supported the video-conference from Bldg. 9 with great success and response from the viewers.



Al Kelly in the Mission Operations Business Management Office captures the Comet Hale-Bopp at his observatory 70 miles south-southwest of Houston. This comet will reach its closest approach to the Sun April 1, 1997 and is predicted by many astronomers to become quite spectacular.